#### MOCKINGBIRD GAS PLANT, LLC.

Mockingbird Gas Processing Plant Facility No.: 106-0021 Monroeville, Monroe County, AL

#### **ENGINEERING ANALYSIS**

#### PROJECT DESCRIPTION

On July 2, 2009, the Department received an air permit application from Mockingbird Gas Plant, LLC for their oil and gas production and processing plant located in Monroeville, AL. The facility is requesting to replace their existing four stoke rich burn (4SRB) natural gas fired 530 HP refrigeration compressor with a 4SRB natural gas fired 215 HP refrigeration compressor engine. The Department requested additional information regarding the unit on July 2, 2009 and a complete application was obtained on July 9, 2009.

#### **PROCESS DESCRIPTION**

The facility obtains its inlet well stream from a series of oil and gas production wells located in the surrounding area. Upon entering the plant, the well stream passes through a 2.0 MMBTU/hr line heater in order to improve the flow of the combined oil, gas, and water stream. The well stream is then sent through a two-phase separator where the water and oil streams are separated from the gas stream.

The gas stream then passes through a glycol (ethylene glycol) dehydrator to remove the remaining water from the gas. The ethylene glycol is regenerated in the 1.25 MMBTU/hr reboiler. The gas stream is currently compressed by a compressor driven by 530 HP compressor engine prior to entering the refrigeration plant. In the refrigeration plant, the natural gas is condensed into natural gas liquids (NGL) composed primarily of propane and butane. The NGLs are then sent to storage until sold or custody transfer. Any remaining gas is sent to the fuel system or sent to the process flare for combustion.

The oil and water emulsion exiting the two-phase separator is then sent through a freewater knockout drum where most of the water is vaporized and separated from the oil. The remaining water is sent to its respective storage tanks until transferred or reinjected into the ground. The oil stream is sent through a crude oil stabilizer where the oil is heated by a 14.5 MMBTU/hr process heater to remove any remaining light liquids. The remaining light liquids are sent to the refrigeration plant for processing. The oil stream is sent to its respective storage tanks until sold or custody transfer. All liquid storage tanks are vented directly to atmosphere.

The facility is currently permitted for the following emission sources:

#### (SMOP 106-0021-X001)

- (H-1) 2.0 MMBTU/hr Line Heater
- (H-2)1.25 MMBTU/hr Reboiler
- (H-3) 14.5 MMBTU/hr Process Heater

#### (SMOP 106-0021-X002)

• (E-1) 530 HP Natural Gas Refrigeration Compressor Engine

#### (SMOP 106-0021-X003)

- (GS-1) Glycol Dehydrator Still Vent
- (T-1 through T-10) Ten 16,800 Gallon Crude Oil Storage Tanks
- (SW-1 through SW-4) Four 16,800 Gallon Salt Water Storage Tanks
- (LPG-1 through LPG-3) Three 30,000 Gallon NGL Storage Tanks
- (F-1) Process Flare

#### **POTENTIAL EMISSIONS**

The potential emissions for the existing 530 HP refrigeration engine and the proposed 215 HP engine are given in Table 1. The table shows that by replacing the 530 HP with the 215 HP, all emissions, with the exception of nitrogen oxide ( $NO_X$ ) emissions were reduced. Since the emissions from all other emission sources located at the facility should remain about the same, only the  $NO_X$  emissions would cause an increase in the facility-wide emissions.

		4		Emissions		
	PM	SO <sub>2</sub>	NO <sub>X</sub>	СО	voc	HAPs
215 HP Engine	7.01E-02	0.00E+00	4.44E+01	2.91E+00	4.36E-01	1.51E-01
530 HP Engine	4.56E-01	9.29E-03	3.49E+01	5.87E+01	4.69E-01	3.23E-01
Difference in Emissions	-3.85E-01	-9.29E-03	9.57E+00	-5.58E+01	-3.26E-02	-1.72E-01

Table 1- Existing vs. Replacement Engine's PTE

Because the emissions from the 215 HP engine are based on manufacturer's data and not actual testing of the unit, the facility has requested that a safety factor of two be applied to the engine's potential emissions. Table 2 shows the total facility wide-emissions. This table indicates that the potential facility-wide NO $_{\rm X}$  emissions are 96.3 tons per year (TPY) after replacing the 530 HP engine with the 215 HP engine and after applying a safety factor of two to the potential emissions for the 215 HP engine. Since the NO $_{\rm X}$  emissions are close to the major source threshold of 100 TPY, the facility has requested that a 20.3 lb/hr NO $_{\rm X}$  limit be placed on the 215 HP refrigeration compressor engine.

	Potential Emissions (TPY)							
	PM	SO2	NO <sub>X</sub>	СО	VOC	HAPs		
215 HP Engine	1.40E-01	0.00E+00	8.89E+01	5.81E+00	8.72E-01	3.03E-01		
Flare		0.00E+00	2.56E+00	1.39E+01	1.38E+01			
Glycol Dehydrator					3.50E-01	2.97E+00		
Heaters	3.67E-01	2.89E-02	4.82E+00	4.05E+00	2.65E-01			
<b>Total Facility Wide Emissions</b>	5.07E-01	2.89E-02	9.63E+01	2.38E+01	1.53E+01	3.27E+00		

Table 2 -Facility-Wide Potential Emissions

Facility wide emissions were based on potential emissions found in the February 8, 2007 engineering analysis for all other emission sources.

#### **REGULATIONS**

The following regulations may be applicable to the proposed 215 HP refrigeration compressor engine:

#### ADEM Administrative Code Rule 335-3-4-.01(1) Control of Particulate Emissions

This regulation requires that any source of particulate emissions shall not discharge more than one 6-minute average opacity greater than 20% in any 60-minute period and that at no time shall any source discharge a 6-minute average opacity of particulate emissions greater than 40%. Although the compressor engine would be subject to this regulation, no monitoring would be required since the fuel source for this unit will be natural gas. PM emissions from the burning of natural gas should be negligible.

**ADEM Admin. Code R. 335-3-11-.06(103),** National Emission Standards for Hazardous Air Pollutants (HAPs) for Stationary Reciprocating Internal Combustion Engines (RICE) (40 CFR 63 Subpart ZZZZ)

Since the engine's location does not meet the definition of a major source of HAPs, the proposed 215 HP natural gas fired refrigeration compressor engine would be located at a site that is considered an area source of HAPs. A major source of HAPs requires 10 TPY or greater of a single HAPs or 25 TPY or greater of a combination of HAPs.

An affected source located at an area source of HAPs emissions can be an existing stationary RICE, a new stationary RICE, or a reconstructed stationary RICE. The proposed 215 HP refrigeration compressor engine was rebuilt on April 6, 2009. However, because the cost to rebuild the engine did not exceed 50% of the fixed capital cost to purchase a new unit, the unit is not considered a reconstructed stationary RICE. Because construction of the engine did not commence prior to June 12, 2006, the engine would not be considered an existing stationary RICE. Therefore, this unit would be classified as a new stationary RICE at an area source of HAPs.

A new stationary RICE at an area source of HAPs would commence construction on or after June 12, 2006. To demonstrate compliance with the requirements of this subpart, a new stationary RICE located at an area source must meet the requirements of 40 CFR 60 Subpart JJJJ for spark ignition engines. No further requirements apply for a new stationary RICE under this subpart.

**ADEM Admin. Code R. 335-3-10-.02(88),**-Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE) (40 CFR 60 Subpart JJJJ)

Under this subpart, the date that construction commences is the date the engine is ordered by the owner or operator. Owners and operators of a stationary SI ICE with a maximum engine power less than 500 HP that commences construction after June 12, 2006, where the stationary SI ICE is manufactured on or after July 1, 2008, is subject to the requirements of this subpart. Construction of the proposed 215 HP refrigeration compressor engine would commence after June 12, 2006; however, the engine was

manufactured on April 29, 1982 and the unit has not been reconstructed. Therefore, the proposed 215 HP refrigeration compressor engine would not be subject to the requirements of this subpart.

ADEM Admin. Code R. 335-3-16-.03, Major Source Operating Permits"

As shown in Table 2, the potential emissions from the proposed 215 HP refrigeration compressor engine are not expected to exceed the 100 TPY threshold for criteria pollutant emissions, the 10 TPY threshold for a single HAP emissions, or 25 TPY threshold for a combination of HAPs emissions. To demonstrate that the facility is not capable of exceeding the major source 100 TPY threshold limit for criteria pollutant, the facility requested that a pound per hour (lb/hr) limit be placed on the engine for  $NO_X$  emissions.

#### **MONITORING**

In order to demonstrate that the facility is capable of meeting the requirement of its Synthetic Minor Operating Permits, the facility would be required to submit an annual monitoring report to the Department. The report should include the facility wide emissions from all emission sources located at the plant.

#### COMPLIANCE AND PERFORMANCE TEST REQUIREMENTS

To demonstrate compliance with the 20.3 lb/hr  $NO_X$  limit requested by the facility, the facility shall perform an initial test on the unit to establish the fuel input (lb/MMBTU). The fuel input would then be used to calculate the actual emissions from the engine. Provided that the calculated emissions from the engine do not exceed the  $NO_X$  limit, the facility would not be required to perform subsequent testing on the unit.

#### RECORDKEEPING AND REPORTING REQUIREMENTS

The facility is required per SMOP 106-0021-X003 to test the heat content (Btu/scf) of the gas stream sent to the flare once every six months. Since the fuel gas burned in the engine is the same as the gas stream sent to the flare, the heat content for the flare can be used to calculate the emissions from the engine. The following records shall also be maintained:

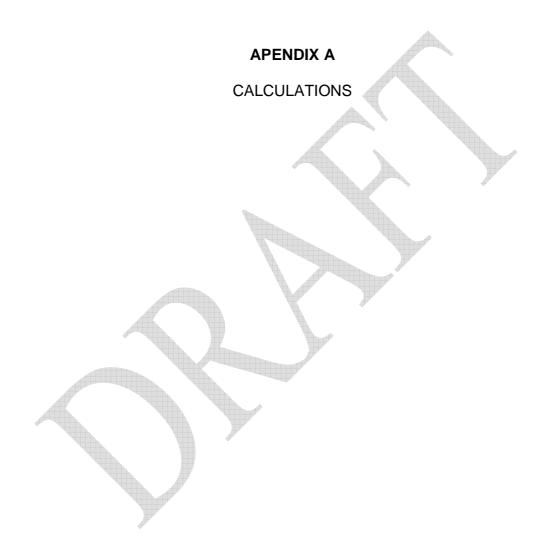
- Fuel input (lb/MMBTU) obtained from the initial performance test on the engine
- Monthly engine fuel consumption (scf/Month)
- Monthly engine operating hours (Hours/Month)
- o NO<sub>X</sub> emissions (lb/Month) and (lb/hr)

The facility wide emissions should be submitted, on an annual basis, to the Department in the form of a monthly summary report of the emissions. The report covering the period from January 1 through December 31, should be submitted within 30 days of the end of the reporting period.

#### **RECOMMENDATIONS**

I recommend that the facility be allowed to replace their existing four stroke rich burn 530 HP refrigeration compressor engine with the proposed 230 HP engine. By replacing this unit, the facility is not expected to exceed the 100 TPY threshold for major sources. The facility should be expected to meet both state and federal regulations for this unit. I recommend that the Department issue SMOP 106-0021-X004 to Mockingbird Gas Plant, LLC for the 215 HP engine after fees have been paid, a fifteen day Public Comment Period has occurred, and any issues regarding the 530 HP engine have been resolved.

Harlotte Bolden Industrial Minerals Section Energy Branch, Air Division



#### **POTENTIAL EMISSIONS**

The following emissions are for the proposed 215 HP refrigeration compressor engine. The  $NO_X$ , CO, and VOC emissions for this unit are based on manufacturer's data submitted with the permit application. Emissions for PM and HAPs emissions were based on AP-42 Emission Factors found in section 3.2 Natural Gas-fired Reciprocating Engine for four stroke rich burn engines. Since the last gas analysis conducted on the gas stream indicates that there is no hydrogen sulfide content in the gas stream, the sulfur dioxide emissions for this unit would be zero.

215 BHP, RIC, Gas Fired Engine Potential Emissions

<u>Pollutants</u>								
РМ	215 HP	9.50E-03 Lb MMBtu	1 MMBtu 10 <sup>6</sup> Btu	7,837 Btu	8,760 Hr Year	1 Ton	=	7.01E-02 Tons
		IVIIVIDIU	IO BIU	I HP-HI	Year	2,000 Lb		Year
SO <sub>2</sub>	1.689 lb Mscf	1.47 Mscf hr	0 mol% H₂S				=	0.00E+00 Tons Year
NO <sub>x</sub>	215 HP	21.4 Grams HP-Hr	1 Lb 453.5 Grams	8,760 Hr Year	1 Ton 2,000 Lb		=	4.44E+01 Tons Year
СО	215 HP	1.4 Grams HP-Hr	1 Lb 453.5 Grams	8,760 Hr Year	1 Ton 2,000 Lb		=	2.91E+00 Tons Year
voc	215HP	0.21 Grams HP-Hr	1 Lb 453.5 Grams	8,760 Hr Year	1 Ton 2,000 Lb		=	4.36E-01 Tons Year
Formaldehyde	215 HP	2.05E-02 Lb MMBtu	1 MMBtu 10 <sup>6</sup> Btu	7,837 Btu HP-Hr	8,760 Hr Year	1 Ton 2,000 Lb	=	1.51E-01 Tons Year

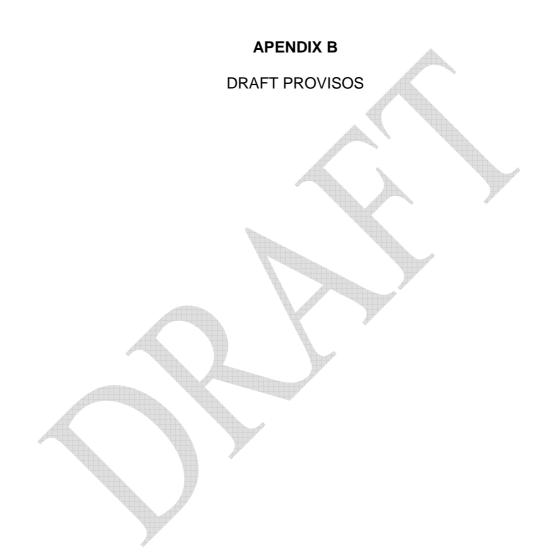
#### Note:

RIC Engine Heat Input Rate = 7,837 Btu/hp-hr Heat Content of Fuel Gas from February 10, 2009 gas analysis for plant flare=1,145.6 Btu/scf

Mscf/hr	7,837 Btu	215 HP	scf	1Mscf		1.47 Mscf
IVISCI/III	HP-hr		1,146 Btu	1,000 scf	=	hr

Potential Emissions from the 215 HP 4SRB engine after applying a safety factor of two:

Potential Emissions (TPY)					
PM	SO2	NO <sub>X</sub>	СО	VOC	HAPs
1.40E-01	0.00E+00	8.89E+01	5.81E+00	8.72E-01	3.03E-01







### SYNTHETIC MINOR OPERATING PERMIT

PERMITTEE: MOCKINGBIRD GAS PLANT, LLC

FACILITY NAME: MOCKINGBIRD GAS PROCESSING PLANT

LOCATION: 880 LANDFILL ROAD, MONROEVILLE, MONROE CO., AL

PERMIT NUMBER DESCRIPTION OF EQUIPMENT, ARTICLE OR DEVICE

106-0021-X004

(E-2) 215 HP Four Stroke, Rich Burn, Natural Gas Refrigeration Compressor Engine

In accordance with and subject to the provisions of the Alabama Air Pollution Control Act of 1971, as amended, <u>Ala. Code</u> §\$22-28-1 to 22-28-23 (2006 Rplc. Vol. and 2007 Cum. Supp.) (the "AAPCA") and the Alabama Environmental Management Act, as amended, <u>Ala. Code</u> §\$22-22A-1 to 22-22A-15 (2006 Rplc. Vol. and 2007 Cum. Supp.), and rules and regulations adopted there under, and subject further to the conditions set forth in this permit, the Permittee is hereby authorized to construct, install and use the equipment, device or other article described above.

**ISSUANCE DATE: DRAFT** 

Alabama Department of Environmental Managem
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# MOCKINGBIRD GAS PLANT, LLC – MOCKINGBIRD GAS PROCESSING PLANT MONROEVILLE, ALABAMA (PERMIT NO. 106-0021-X004) PROVISOS

- 1. This permit is issued on the basis of Rules and Regulations existing on the date of issuance. In the event additional Rules and Regulations are adopted, it shall be the permit holder's responsibility to comply with such rules.
- 2. This permit is not transferable. Upon sale or legal transfer, the new owner or operator must apply for a permit within 30 days.
- 3. A new permit application must be made for new sources, replacements, alterations or design changes which may result in the issuance of, or an increase in the issuance of, air contaminants, or the use of which may eliminate or reduce or control the issuance of air contaminants.
- 4. Each point of emission will be provided with sampling ports, ladders, platforms, and other safety equipment to facilitate testing performed in accordance with procedures established by Part 60 of Title 40 of the Code of Federal Regulations, as the same may be amended or revised.
- 5. In case of shutdown of air pollution control equipment for scheduled maintenance for a period greater than **24 hour**, the intent to shut down shall be reported to the Air Division at least 24 hours prior to the planned shutdown, **unless accompanied by the immediate shutdown of the emission source.**
- 6. In the event there is a breakdown of equipment in such a manner as to cause increased emission of air contaminants for a period greater than **8 hour**, the person responsible for such equipment shall notify the Air Division within an additional 24 hours and provide a statement giving all pertinent facts, including the duration of the breakdown. The Air Division shall be notified when the breakdown has been corrected.
- 7. This process, including all air pollution control devices and capture systems for which this permit is issued, shall be maintained and operated at all times in a manner so as to minimize the emissions of air contaminants. Procedures for ensuring that the above equipment is properly operated and maintained so as to minimize the emission of air contaminants shall be established.
- 8. This permit expires and the application is cancelled if construction has not begun within 24 months of the date of issuance of the permit.
- 9. On completion of construction of the device for which this permit is issued, notification of the fact is to be given to the Chief of the Air Division. Authorization to operate the unit must be received from the Chief of the Air Division. Failure to notify the Chief of the Air Division of completion of construction and/or operation without authorization could result in revocation of this permit.

- 10. Submittal of other reports regarding monitoring records, fuel analyses, operating rates, and equipment malfunctions may be required as authorized in the Department's air pollution control rules and regulations. The Department may require stack emission testing at any time.
- 11. Additions and revisions to the conditions of this Permit will be made, if necessary, to ensure that the Department's air pollution control rules and regulations are not violated.
- 12. Nothing in this permit or conditions thereto shall negate any authority granted to the Air Division pursuant to the Alabama Environmental Management Act or regulations issued thereunder.
- 13. This permit is issued with the condition that, should obnoxious odors arising from the plant operations be verified by Air Division inspectors, measures to abate the odorous emissions shall be taken upon a determination by the Alabama Department of Environmental Management that these measures are technically and economically feasible.
- 14. Precautions shall be taken to prevent fugitive dust emanating from plant roads, grounds, stockpiles, screens, dryers, hoppers, ductwork, etc.

Plant or haul roads and grounds will be maintained in the following manner so that dust will not become airborne. A minimum of one, or a combination, of the following methods shall be utilized to minimize airborne dust from plant or haul roads and grounds:

- (a) by the application of water any time the surface of the road is sufficiently dry to allow the creation of dust emissions by the act of wind or vehicular traffic;
- (b) by reducing the speed of vehicular traffic to a point below that at which dust emissions are created;
- (c) by paving;
- (d) by the application of binders to the road surface at any time the road surface is found to allow the creation of dust emissions:

Should one, or a combination, of the above methods fail to adequately reduce airborne dust from plant or haul roads and grounds, alternative methods shall be employed, either exclusively or in combination with one or all of the above control techniques, so that dust will not become airborne. Alternative methods shall be approved by the Department prior to utilization.

15. The permittee shall not use as a defense in an enforcement action that maintaining compliance with conditions of this permit would have required halting or reducing the permitted activity.

- 16. Nitrogen oxide (NO<sub>X</sub>) emissions from the 215 HP natural gas refrigeration compressor engine shall not exceed **20.3 pound per hour (lb/hr)**.
- 17. Provided that there is an exceedence of the permit limit found in Proviso 16 of this permit, a deviation from the permit requirements shall be deemed to have occurred.
- 18. To demonstrate compliance with Proviso 16 of this permit, the engine shall be tested in accordance to the requirements specified in Proviso 18(a) through (f) of this permit.
  - (a) Testing shall occur within six (6) months of the issuance of this permit.
  - (b) Testing shall consist of three runs of at least one (1) hour in duration.
  - (c) Each run shall test for nitrogen oxide (NO<sub>X</sub>) emissions.
  - (d) Each run shall be conducted in accordance to the requirements specified in either Proviso 18(d)(i) or (ii) of this permit.
    - i) Methods and procedures specified in 40 CFR Part 60 Appendix A, Test Methods 1, 2, 3, 4, 7 and 19 including all EPA approved variations of these test methods, **OR**
    - ii) Other methods as approved by the Department.
  - (e) The pollutants tested for and the methods and procedures that are utilized may be modified upon receiving Departmental approval.
  - (f) Provided the test was not conducted in accordance to the requirements specified in Proviso 18(a) through (d) of this permit, a deviation from the permit requirements shall be deemed to have occurred.
- 19. The Air Division must be notified in writing at least 10 working days in advance of all emission tests to be conducted and submitted as proof of compliance with the Department's air pollution control rules and regulations.

To avoid problems concerning testing methods and procedures, the following shall be included with the notification letter:

- (a) The date the test crew is expected to arrive, the date and time anticipated of the start of the first run, how many and which sources are to be tested, and the names of the persons and/or testing company that will conduct the tests.
- (b) A complete description of each sampling train to be used, including type of media used in determining gas stream components, type of probe lining, type of filter media, and probe cleaning method and solvent to be used (if test procedure requires probe cleaning).

- (c) A description of the process(es) to be tested, including the feed rate, any operating parameter used to control or influence the operations, and the rated capacity.
- (d) A sketch or sketches showing sampling point locations and their relative positions to the nearest upstream and downstream gas flow disturbances.

A pretest meeting may be held at the request of the source owner or the Department. The necessity for such a meeting and the required attendees will be determined on a case-by-case basis.

All test reports must be submitted to the Air Division within 30 days of the actual completion of the test, unless an extension of time is specifically approved by the Air Division.

- 20. When possible and practicable, a continuous metering system shall be utilized that is capable of continuously monitoring and recording the fuel gas flow rate to the engine.
  - (a) The continuous measurement may be made with a single meter through which all of the fuel gas for identical make and model engines flow.
    - i) Calibration, maintenance and operation of metering system shall be performed in accordance to manufacturer's specification.
    - ii) Volumetric flow of fuel gas streams that are not continuously measured shall be accounted for by utilizing special estimating methods (i.e. engineer estimates, material balance, computer simulation, special testing etc.).
- 21. Monitoring for this unit shall consist of maintaining records as specified in Proviso 22 of this permit.
- 22. A monthly record of the information specified in Proviso 22 (a) through (c) of this permit shall be maintained.
  - (a) Engine Fuel Gas Consumption [Engine Fuel Gas (MScf/Month)]
  - (b) Engine Operating Hours [Engine Operating Hours/Month]
  - (c) Nitrogen Oxide (NO<sub>X</sub>) emissions shall be determined as follows:
    - i)  $NO_X$  Emissions [Lb/Month] =

Heat Input 
$$\left(\frac{Lb}{MMBtu}\right)$$
\* Heat Content  $\left(\frac{Btu}{scf}\right)$ \*  $\left(\frac{1MMBtu}{10^6Btu}\right)$ \* Engine Fuel Gas  $\left(\frac{Mscf}{Month}\right)$ \*  $\left(\frac{10^3scf}{Mscf}\right)$ 

where.

Fuel Heat Input is obtained through the initial testing of the engine and the Heat Content is obtained from the most recent gas analysis of the fuel gas sent to the process flare.

ii)  $NO_X$  Emissions [Lb/hr] =

$$\frac{\text{NO}_{\text{X}} \text{ Emissions} \left( \frac{Lb}{Month} \right)}{\text{EngineOperatingHours} \left( \frac{Hours}{Month} \right)}$$

- 23. Provided that the records are not maintained as required in Proviso 22 of this permit, a deviation from the permit requirements shall be deemed to have occurred.
- 24. Records shall be kept in a permanent form suitable for inspection and will be retained for at least two years following the date of each occurrence
- 25. To demonstrate compliance with Proviso 16 of this permit, the facility shall submit a monitoring report to the Department that meets the following requirements:
  - (a) Report shall include a summary of the monthly facility-wide  $NO_X$  emissions from all emission sources located at the plant.
  - (b) Report shall cover a reporting period from January 1 through December 31.
  - (c) Report shall be submitted annually within 30 days of the end of the reporting period.
- 26. Provided that the monitoring report does not meet the requirements specified in Proviso 25 of this permit, a deviation shall be deemed to have occurred.
- 27. All deviations from requirements within this permit shall be reported to the Department within 48 hours of the deviation or within 2 work days while providing a statement with regards to the date, time, duration, cause and corrective actions taken to bring the sources back into compliance. A review and evaluation of this report shall be utilized in Departmental determination of whether or not a violation of a permit requirement or requirements occurred.
- 28. The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege.

July 13, 2009 Draft Date